DOCUMENT RESUME

ED 391 002 CE 070 396

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TITLE Employees' Knowledge of Carpal Tunnel Syndrome.
PUB DATE 95
NOTE 12p.
PUB TYPE Information Analyses (070)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Adult Education; *Educational Needs; *Employee Attitudes; *Health Promotion; Industrial Training; *Knowledge Level; *Labor Education; *Occupational Safety and Health
IDENTIFIERS *Carpal Tunnel Syndrome

ABSTRACT

A study examined employees' knowledge of the causes of carpal tunnel syndrome (CTS), its prevention, and their legal rights after being diagnosed with CTS. A 24-item questionnaire was administered to a random sample of 30 Chicago-area employees who had been afflicted with CTS. Of those surveyed, 99% considered their CTS injury related to their job, preventable, neither genetic nor influenced by gender, and related to their lack of knowledge surrounding legal rights and job safety issues. Although 99% of the respondents were not informed of their legal rights after their CTS injury, 88% received pain compensation, 70% were given a different job, 80% were given adequate time from the job, 90% were given rest time to compensate for their CTS, and 92% considered the follow-up treatment they received adequate. All 30 respondents believed that CTS has reduced their job performance/abilities. The respondents were concluded to have a very good working knowledge and understanding of CTS; however, existing education and information concerning CTS was deemed ineffective and haphazard in certain occupations. It was therefore recommended that dispensing of information about CTS should be both part of the employee orientation process and an ongoing part of employee education in work and medical settings. (Contains 13 references.) (MN)

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EMPLOYEES KNOWLEDGE OF CARPAL TUNNEL SYNDROME

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The earliest know description of Carpal Tunnel Syndrome (CTS) appeared in the medical documentation in 1865 when Sir James Paget lectured about a condition involving median nerve compression after a wrist fracture--acute trauma (U.S. Dept. of Health and Human Services, March 1989). It is part of the family of disorders called cumulative trauma disorders or musculoskeletal disorders. It is also know by the terms overuse syndrome and repetitive motion sickness. Occupational CTS has only recently, within the past decade, drawn the attention of government agencies, private industry, and the medical protession because of the effects on work scheduling, production, increasing workers compensation costs, and personal suffering and disability (Vibrant Life, April 1992).

Carpal Tunnel Syndrome has become one of the fastest growing injuries currently being diagnosis in this decade with the majority of the cases being diagnosed of an occupational origin. The old saying of an "ounce of prevention is worth a pound of cure" is definitely true in the case of occupational CTS. Some individuals feel that disorders are as much a product of the culture as people and language. Carpal Tunnel Syndrome has become the "in" disease of the nineties. Society has created millions of jobs that require consistent repetitive motions involving the hands and wrists.

The American worker is at risk of becoming an endangered species as the number of job related injuries and diseases continue to increase. Being aware of the causes and preventive methods available is essential to controlling occupational Carpal Tunnel Syndrome (Schenck, December 1989).

The Carpal Tunnel Syndrome receives its name from the eight (8) bones in the wrist called carpals, that form a tunnel-like structure. This tunnel is filled with tendons which control finger movement. It also provides a pathway for the median nerve to reach sensory cells in the hand. Compression on the median nerve in the wrist will result in sensory and motor dysfunctions in the hands. Nerve compression can result from a host of conditions including wrist fractures, tumors, rheumatoid arthritis and diabetes mellitus. In the mid 1960's researchers began to observe an association between wrist disorders and the performance of certain repetitive manual tasks. Regardless of whether the cause is occupationally-based or arises from non-occupational sources, it has been established that repetitive flexing and extension of the wrist cause the tendons, to swell and thereby increase pressure in the bony tunnel. This, in turn, can trap or pinch the median nerve. Blockage of this nerve can cause a loss of touch in certain surface areas of the hand and produce numbness, pain and tingling in the thumb, index and ring fingers. When this condition is detected, it is labeled as Carpal Tunnel Syndrome.

Carpal Tunnel Syndrome has many adverse consequences. Many employees with CTS are unable to differentiate hot from cold by touch and will show a loss of strength in their fingers. Employees often appear clumsy and they have trouble performing simple tasks such as tying their shoelaces or picking up small objects.

Occupational Carpal Tunnel Syndrome has become the most prevalent of the cumulative trauma disorders. When surveying the workers who have been diagnosed with CTS, very few of them could say that they were informed of the risk involved in performing certain tasks or of the preventive methods available for risk reduction. The proper course of action in the reduction of CTS is to categorize the and research the conditions. This research has been narrow downed to into the categories of occupational and non-occupational.

Occupational Carpal Tunnel Syndrome falls under the category of cumulative trauma disorders and is part of the musculoskeletal disorders

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group. The U.S. Dept. of Health Center for Disease Control defines it as median nerve compression resulting from inflammation and swelling of the flexor tendons that surround the median nerve as it passes through the carpal tunnel changing the way the nerve works (National Safety Council, 1991).

Non-Occupation Carpal Tunnel Syndrome falls under the same category in its definition of symptoms like occupational CTS with only one difference. The different being the cause. Non-occupational CTS is often predispose to certain medical conditions and they are as follows:

1. Congenital defects
2. Systematic disease
3. Pregnancy
4. Wrist size
5. Acute wrist trauma
6. Oral contraceptive use
7. Position while sleeping

Symptoms of the disease are tingling, numbness, burning sensations, and loss of motor and sensory abilities in the hands and overall pain as the condition progresses. Occupational Carpal Tunnel Syndrome begins in the hands but can progress up the arms, shoulders, and neck as the condition worsens. It is mainly associated with forceful repetitive motion usually involving the upper extremities, hands, wrists, and arms (Sand, 1992).

In order to fully understand the full scope of this disability, you must understand what constitutes repetitive motion. Repetitive motion can best be described as using any motion to perform a task, or job repeatedly over an extended period of time. An example of repetitive motion would be a data entry operator striking the keys repeatedly with a certain amount of force to produce or perform the required task (National Cancer Institute, May 1992). Repetitive motion is the leading cause of occupational Carpal Tunnel Syndrome (Nathan, 1990). Other occupations that are at risk due to repetitive motions are:

1. Mechanics
2. Operators of machines (computer, key punch/press etc)
3. Poultry Processor
4. Machine Operators
5. Stationary Engineers
6. Assembly Line Workers/Packers
7. Power Drivers
8. Publishing Companies
9. Butchers
10. Film and Paper Packing
11. Manufacturers of (grocery, small engine, producers etc.)
12. Social-Workers
13. Supervisors
14. Managers (Administrative)

There were over thirty nine occupations studied to calculate the incidents of Carpal Tunnel Syndrome (U.S. Dept. of Health and Human Services, March 1989).

The most prominent factor in the category of risk is, of course, repetitive motion, and other risk factors are sex, age, and medical condition (U.S. Dept. of Health & Human services, March 1989). Prevention, diagnosis and treatment are fundamental in fighting the occurrences of Carpal Tunnel Syndrome. Preventative methods can best be categorize by the following:

1. Ergonomic work centers - work station design around the person range and motion (Savage, December 1972).
2. Job rotation, assessing and rotating job tasks.
3. Rest periods - the most important factor is to have proper rest to reduce the incident/reoccurrence of CTS (Betts, September 1992).

4. Stretching exercises releases stress and strain on the extremities.
5. Aerobic exercise increasing mobility strength and nerve inductance.
6. Education to know all elements that factor into preventing CTS. There are several methods used in the diagnosing of Carpal Tunnel Syndrome. They are as follows:
   a. Tinel's Test - tapping on the patient's wrist to measure the degree of pain (Haase 1990).
   b. Phalen Test measures the flexing of the hands (Schenck 1990).
   c. Electromyogram to measure the reaction times the speed of the muscles (Schenck 1990).
   d. Ridge Test measuring the lost of touch (Schenck 1988).
   e. Vibrometer - measures vibration senses (Schenck 1990).
7. Workers must know their legal rights to protect themselves and assure themselves that they are being treated with fairness and equality.

There are two basic treatments options currently being practiced by the medical profession, primary conservative treatment and surgical decompression. Primary conservative treatment can involved wearing of splints and taking anti-inflammatory medication taken orally (Hassel 1990). Surgical decompression - is performed only when primary conservatives indicates a lack of response, it involves surgical release of the nerve (Schenck 1989). These choices are based on the need of the individual and physician (Schenck 1988).

The effects of occupational Carpal Tunnel Syndrome upon an individual vary per individual and it can require small changes, or it can be devastating for industry and individuals. Companies are beginning to challenge the rising claims and lawsuits from CTS or repetitive stress injuries. The challenges stem from predisposed conditions for CTS to a current get rich quick fad. According to Linda Morse, M.D., an Occupational Medical Specialist in San Jose, California, women do much more of the work that is starting to cause CTS. They are also more likely to hold jobs that are do not provide health insurance coverage and may experience difficulties in covering the costs of this injury. They cannot depend on workers compensation while their case is being challenged by their employers (1991).

Once an employee has been identified as having CTS, the employers should systematically analyze the work settings and job tasks for occupational risk factors. Remembering that all jobs are performed by a sequence of acts or elements. A list of fundamental elements should be reviewed for the contributing factors. The list should include the following:

A. Posture
B. Strength
C. Stress concentrations over the palm
D. Vibration
E. Cold Temperature
F. Gloves

After the job analysis has been completed, alternative work stations, tools and methods are to be considered to reduce stress on the hands and wrists.

Employees afflicted with CTS are confronted with a life offering continuous pain and a lack of compassion and understanding from society. According to Dr. Moline at the Occupational Health Clinical Center at Mount Sinai in New York City, fours times as many women as men are diagnosed with CTS.
Many employees afflicted with CTS express feelings of fear, pain, and shock. The fear and pain stem from the affliction and the shock occurs with the sudden and often permanent lifestyle changes required (1994).

People with CTS must be re-trained in the use of their hands at home and work. Care and treatment becomes an ongoing part of the employees' lives. One woman stated in the article "Work Hurts," (1993), that her hands took over her life. Another common statement from employees' afflicted with CTS is a

sudden and lasting feeling of hopelessness, along with periods of depression. Depression becomes an on-going battle that requires a great deal of support and understanding from their families, friends, and co-workers. As one employee stated, who had the surgery on both extremities by one of the leading hand surgeons, Dr. Robert Schenck, Rush-Presbyterian St. Lukes Medical Center, "You're damned if you do use them and damned if you don't. If you don't use your hands then you lose muscle tone and hand strength; however, if you over use them then the condition worsens and you lose muscle tone and hand strength. And yet, there is nothing that a person can do that cannot be considered as repetitive" (1994, p.25).

In responses to surgical questions that were asked of an employee who has CTS, they responded by stating that "surgery did not permanently take away the pain or the feelings of uselessness" (Horowitz, 1992, p.31).

An adequate program of physical therapy can restore the worker's confidence in his ability to perform the task implicit in his job, without undo fear of reinjuring himself. Therefore, the purpose of the study is to determine how knowledgeable employee, who are afflicted with CTS, of the issues related to Carpal Tunnel Syndrome.

Questions to be Studied

1. How knowledgeable are employees with CTS in regard to its causes and the impact of CTS?
2. How knowledgeable are employees in reference to their rights as employees regarding on the job safety.
3. How knowledgeable are employees in the methods/practices for prevention, evaluation of medical treatment and rehabilitation?
4. How knowledgeable are employees on their legal rights after being diagnosed with CTS?

Procedures

Population and Sample

The population/sample for this study included 300 Chicago area employees, a random sample of 30 employees who had been afflicted with Carpal Tunnel Syndrome was selected for the sample. The participants were administered the CTS Survey via mail and individually by the researcher. The participants were administered the CTS Survey. The survey consisted of 24 items requiring an agree or disagree response. They were further asked to complete the survey as accurately as possible and not to sign their name to the survey. The CTS Survey was pilot tested on ten members of the population who were not included in the sample. The findings were tabulated in terms of percentages. The Chi Square test will be employed at the .05 level of confidence to determine the significant difference between the responses.

Results

The purpose of this study was to determine how knowledgeable employees are who have been diagnosed with CTS regarding the issues related to CTS. In the past ten years, more and more cases of workers afflicted with Carpal Tunnel Syndrome have been reported. One reason for the increase may be that automation and job specialization have fragmented workers tasks to the point where a given job may involve only a few manipulations performed thousands of times per work day. The increased awareness of work tasks as a factor in the onset of CTS is reflected in the growing numbers of requests for health hazard evaluations stemming from the reported cases of CTS. The data were analyzed according to four general questions. The results are depicted in the following tables.

1. How knowledgeable are employees with CTS in regard to the causes of CTS?
2. How knowledgeable are employees in reference to their rights as employees regarding on the job safety?
3. How knowledgeable are employees in the methods/practices for prevention, evaluation of medical treatment and rehabilitation?
4. How knowledgeable are employees of the impact of CTS?

The results are depicted in the following tables. Table I provides responses on the issue of the cause of Carpal Tunnel Syndrome:

Table I depicts the responses of employees' knowledge of CTS causes:

Table I

Causes of Carpal Tunnel Syndrome

N=30

	AGREE	DISAGREE
Do you feel that most cases of Carpal Tunnel Syndrome are work related?	99%*	01%
Do you feel that your injury could have been prevented/avoided?	99%*	01%
Do you fully understand this type of injury/disease in its relation to your lifestyle?	95%*	05%
Do you feel that a person's gender increases their changes in contracting Carpal Tunnel Syndrome?	01%	99%*
Do you feel that employers, in general, should warn their employees about the risk involved with specitic job tasks?	100%*	0%
Do you feel that you were at risk of having Carpal Tunnel Syndrome due to genetic factors, and or medical factors?	01%	99%*

* Significant at the .05 level

The data in Table I show that a significant (.05) majority (99%) believed that their CTS injury was related to their job, could have been prevented, and felt CTS was related to life (job) style. One hundred percent felt that their employer should have notified them of possible CTS injury on the job. However 99 percent did not believe CTS was genetic nor influenced by gender.

Table II illustrates the responses on job safety:

Table II

Knowledge of Job Safety Issues

N=30

	AGREE	DISAGREE
Does your job require repetitive motions?	100%*	00%
Does your job allow you to have rest periods?	90%*	10%
Has your employer allowed or given you adequate time off, for recovery, and rehabilitation from your injury?	80%*	20%
Did your employer offer to change or rotate your positions to compensate for your injury?	70%*	30%
Where you retrained after your initial period of rehabilitative therapy?	95%*	05%
Has learning newer/different methods of performing your job helped your condition?	70%*	30%
Did you experience any reoccurrence of the symptoms and pain upon returning to work?	80%*	20%
Did you receive pain compensation from your employer?	88%*	12%
Were you informed by your employee of your legal rights as an injured employee, once diagnosed with CTS.	01%	99%*

* Significant at the .05 level

The data in table II show that a significant (.05) majority (99) believed that their CTS injury was related to their lack of knowledge surrounding legal rights and job safety issues. One hundred percent felt that their job required repetitive motions. And on the other hand, 99% were not informed of their legal rights after the injury. However, 88% received pain compensation, 70% were given a different job, 80% were given adequate time from the job, and 90% were given rest time to compensate for their CTS.

Table III shows employees' responses on medical help:

Table III

Evaluation of Medical Treatment and Rehabilitation

N=30

	AGREE	DIS-AGREE
Were you retrained after your initial period of rehabilitative therapy?	95%*	05%
Did the treatment offered by your physician assist in your recovery?	80%*	20%
Do you feel that the diagnosis of your illness was a simple process?	05%*	95%*
Do you feel that you were properly informed by your physician of the implications of this illness? If not, did you seek any information on you own?	95%*	05%
Do you feel the medical staff has been adequately trained in diagnoses and treatment of this illness?	73%*	27%
Do you feel you received adequate follow-up treatment?	92%*	08%

* Significant at the .05 level

The data in Table III show that a significant (.05) majority (95%) believed that their CTS diagnosis was not a simple process. However, 92 percent felt that they receive adequate follow-up treatment. This included retraining (95%), properly infomred by physician (95%), and adequate medical treatment (73%).

Table IV illustrates employees' responses

Table IV

Impact of Carpal Tunnel Syndrome

N=30

	AGREE	DISAGREE
Do you feel the effects of Carpal Tunnel Syndrome have had an impact upon your life?	98%	*02%
Is pain now a constant part of your life since contracting Carpal Tunnel Syndrome?	98%*	02%
Has your job performance/ability decreased since the onset of this disease?	100%*	0%

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If you returned to work in the same capacity, performing the same job, has the pain you experienced before treatment returned?	90%*	10%

* Significant at the .05 level

The data in Table IV show that a significant (.05) majority (100%) believed that their CTS injury has reduced their job performance and/or abilities. However, 98 percent felt that their lives have been impacted and that pain is a constant part of it.

Findings

Carpal Tunnel Syndrome is classified in two categories, occupational, and non-occupational. Occupational CTS is caused by repetitive motions, and non-occupational CTS is usually caused by an underlying medical condition or predisposition to the disease. Questions were asked to obtain employee's knowledge on the causes of CTS. The results in Table I show that a significant (.05) majority (99%) believed that their CTS injury was directly related to their employment, could have been prevented, and felt CTS was related to life (job) styles. One hundred percent felt that their employers should have notified them of the possible of acquiring CTS on the job. However, 99 percent did not believe CTS was genetic nor influenced by gender. Employees lack the knowledge and/or information pertaining to non-occupational CTS which further demonstrates a need for education.

Job safety issues were explored through a series of questions to establish competence levels of safety amongst employees and employers. Surprisingly, most employees and employers were very knowledgeable in this area of safety. The findings in Table II show that a significant (.05) majority believed once afflicted with CTS safety measures were in place, although only 1% was told after being injured of their legal rights.

Evaluation of medical treatment and rehabilitation is often a long and difficult process. Once the right physician is found the evaluation and treatment process can begin. The data in Table III regarding the difficulties employees experienced in the area of evaluation, treatment and rehabilitation, show that a significant (.05) majority were comfortable in their evaluation and treatment process after acquiring CTS and the proper diagnosis. The impact of CTS is devastating to the individual employee. The employee must now learn to live with constant pain and the haunting question of why me, or will I ever get better? The data in Table IV depict that a significant (.05) majority believed that their lives were heavily impacted by CTS, along with permanent lifestyle changes being required.

Summary

An analysis of the findings revealed that the people surveyed did have a very good working knowledge and understanding of the causes of occupational CTS. CTS is a disabling condition of the hand that can be caused, precipitated or aggravated by certain work activities. Activities include exertions with a flexed or hyper-extended wrists - especially in combination with forceful exertions, use of tools that produce stress on the base of the palm, exposure to vibrations and cold, and the use of some gloves. Stressful work activities can be identified through analysis of health records, work methods, and postures. Examples of how jobs can be redesigned for control of stressful exertions should be explored along with educating employees on the causes of CTS before hiring them for certain positions.

The overall findings depict a clear understanding of the employees knowledge of the issues that impact CTS. The results indicate that a significant (.05) majority (99%) believed that their CTS injury was related to their job, could have been prevented, and felt CTS was related to life (job) style. One hundred percent felt that their employer should have notified them of possible CTS injury on the job. However 99 percent did not believe CTS was genetic nor influenced by gender. The findings suggest a significant (.05) majority (99) believed that their CTS injury was related to their lack of knowledge surrounding legal rights and job safety issues. One hundred percent felt that their job required repetitive motions. However, 95 percent agreed that they were retrained after receiving rehabilitative therapy.

Subsequent results show that a significant (.05) majority (95) believed that their CTS diagnosis was not a simple process. However, 92 percent felt that they receive adequate follow-up treatment. Also a significant (.05) majority (100%) believed that their CTS injury has reduced their job performance and/or abilities. But 98 percent felt that their lives have been impacted and that pain is a constant part of it. In addition their knowledge of job safety issues, medical evaluation, treatment, and rehabilitation was on track after finding the right physician to diagnosis their injury. The impact of CTS had varying degrees of devastation, but the pain and the lifestyle changes are on-going and depressing to most. Education and re-training appears to be the proper combatant for employees afflicted with CTS.

Conclusion

Carpal Tunnel Syndrome is strongly associated with force and highly repetitive work and to a lesser extent with high repetitiveness alone, irrespective of other factors. High force combined with high repetitiveness appears to have more than a multiplicative effect increasing the risk more than five (5) times that of either factor alone.

However effective or ineffective the medical treatments are, one tends to wonder if with early diagnosis and prior education would CTS still be the injury of the nineties. Employees are angry and outraged by this growing, preventable, affliction. Warning signs and communication about this affliction have not been communicated to employees prior to their acquiring the affliction. Employees feel that their rights have been violated and their lives placed in danger from not being properly informed about this work related illness.

Employees afflicted with CTS who are fortunate to have insurance and benefits are in a much better position than those workers who do not. Employees who do not have insurance are often challenged and denied their claims of acquiring CTS from their employment. Many women are faced with the problem of having no insurance or being under insured in the workplace.

Employees feel that they have been punished instead of rewarded for working hard and consistently, because they acquired CTS. Since occupational CTS is caused by repetitive motions and all jobs require repetitive motion to some degree then what is the solution. The solutions for employers and employees is education. CTS is rarely a disease that requires immediate surgery, therefore education becomes the deciding factor in reducing the chances of acquiring the disease or injury.

Implications

The results of this study indicate that there is a need for education on CTS. It further appears that an ineffective and haphazard communication network exists in certain occupations and professions. The dispensing of information on CTS should be part of orientation, evaluation and become an on-going part of employee education in both the work and medical settings.

Occupational CTS is caused by repetitive motion. Employees with jobs that require highly repetitive functioning are much more likely to become afflicted

with CTS. CTS afflicts more women than mens: a) smaller wrists, b) oral contraceptives, c) chosen professions, and d) gender. There is a indication for more education on CTS and the causes and preventive methods (occupational and non-occupational). Employees appear to be versed on the causes, safety, medical evaluation, treatment, and rehabilitation, after becoming afflicted with CTS and not before. One tends to question the rational behind educating employees after becoming afflicted with CTS and not before. Education and prevention is the key to slowing this growing trend. Only with increased awareness of CTS and teaching people how to use their hands in a safer, easier and more comfortable manner with prevention as a goal, can all individuals develop a greater respect for combating and reducing the chances of acquiring CTS.

Recommendations

1. All employers should be required to educate their employees on CTS (Repetitive Motion Sickness).
2. It is important to recognize and treat CTS early before any lasting damage occurs.
3. Legal issues should be discussed and reviewed for updates and changes.
4. Therapy should be given to all individuals afflicted with CTS.
5. Employers and employees should be continually informed of changes and updates on causes and preventative methods involving CTS.
6. Counseling for depression and social stigma should be given.
7. Claims should be processed quickly for individuals with minimal or no insurance coverage with the costs being absorbed by the employers.
8. CTS should be viewed as an affliction and never referred to as a trend or a fad.
9. Physician's need more training on recognizing the signs and symptoms of CTS.
10. Written and verbal education should be given to all employees regarding repetitive stress injuries.
11. Work areas and hand positioning should be reviewed and changed to insure maximum safety for employees and employers.
12. Risk factors should be viewed and discussed before hiring and/or applying for certain positions.
13. Legal issues, implications, safety, and causes should be updated and reviewed as new information becomes available.
14. Methods of improving this research study?
    A. Larger sample
    B. Diverse Occupations
    C. Analysis of results according to occupation, age, gender and time (years) performing repetitive tasks.

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